IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

JOSEPH G. SUPINA et al.

Group Art Unit: 3618

Examiner: Bridget D. Avery

Serial No.: 10/605,315

Filed: September 22, 2003

For: HYBRID VEHICLE POWERTRAIN WITH IMPROVED REVERSE DRIVE PERFORMANCE

Attorney Docket No.: 81044241/FMC1531PUS

REPLY TO EXAMINER'S ANSWER TO APPLICANTS' APPEAL BRIEF

Commissioner for Patents
U.S. Patent & Trademark Office
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

The Examiner's Statement of the Grounds of Rejection recites a comparison of the elements of claim 1 set forth in Applicants' specification with corresponding elements of reference patent 5,887,670. There is no corresponding comparison of the elements in Applicants' other independent claims, specifically claims 2 and 11 of Appellants' specification.

The Examiner's comparison of the elements of claim 1 of Applicants' specification to the '670 patent disclosure is inaccurate. Reference to an electric motor and an electric generator on page 3 of the Examiner's Answer refers to the hybrid electric powertrain disclosed in Figure 1 of Applicants' drawings. Figure 1, however, does not illustrate the present invention. Figure 1 was included in Applicants' specification and in the drawings merely for the purpose of describing a known hybrid electric powertrain of the kind disclosed in previously identified co-pending patent applications, which are cross-referenced in Applicants' specification on page 1, paragraph 001. The hybrid electric vehicle powertrain of

Applicants' Figure 1 has a gear system that is entirely distinct from the embodiments of Applicants' present invention shown in Figures 2 and 3 of Applicants' drawings.

A generator is disclosed in Applicants' drawings at 40 in Figure 2 and at 40′ in Figure 3. An electric motor of Applicants' invention is disclosed at 74 in the embodiment of Figure 2 and at 74′ in the embodiment in Figure 3.

Further, the Examiner indicates that Applicants' specification discloses clutches at 62 on page 11, paragraph 31, as indicated in Figure 2 of Applicants' drawings. Actually, numeral 62 is used to indicate a single clutch, not clutches (plural). Further, it is incorrect to describe clutch 62 as a "clutch/brake". Applicants disclose a clutch at 62 and a separate brake at 60. Contrary to the Examiner's analysis of the reference '670 patent, the clutches E1 and CE2 described in the reference '670 patent have independent functions. They should not be compared to the single clutch 62 of Applicants' Figure 2 embodiment, which has a single function.

On page 4 of the Examiner's Answer, first paragraph, it is incorrect for the Examiner to state that the clutch CE1 of the '670 patent is positioned between ring gear 16_R and torque output element 26. Actually, clutch CE1 is positioned between ring gear 16_R and the engine-driven power input shaft. Further, element 26 is described in the '670 patent as an input shaft for transmission 18 and an output shaft of the planetary device 16 (col. 13), not as a torque output element of the powertrain as recited in claim 1. It is also incorrect to state that when clutch CE1 is disengaged from motor 14, the motor 14 is isolated from the ring gear 16_R. In any case, this statement is irrelevant because Applicants' claims are directed to reverse drive performance during a reverse driving power delivery mode. Unlike Applicants' invention, reverse drive in the transmission disclosed in the '670 patent is achieved by downstream gearing, shown at 34, 36 and 38. Reverse drive in that transmission is obtained by engaging brake B4 in the downstream gearing and engaging clutch CE2. Clutch CE1 disclosed in the '670 patent reference is off in mode 6 during operation in the regenerative mode for the motor/generator 14. Reference to the regenerative mode, however, is irrelevant to the rejection.

The second paragraph on page 4 of the Examiner's Answer states that the '670 patent lacks a teaching of a reaction brake that anchors the ring gear during reverse power delivery. This deficiency, however, cannot be overcome by the teachings of the secondary reference '155 patent. The ring gear of the '670 patent is not braked to achieve reverse. Reverse is obtained by engaging brake B4 and clutches C2, C0, and CE2.

In the third paragraph on page 4 of the Examiner's Answer, an attempt is made to rely upon the secondary '155 patent to supply the deficiencies of the reference '670 patent. The reference '155 patent, however, merely describes reversing the direction of rotation of the single motor-generator 6, seen in Figure 4 of the reference '155 patent, to obtain reverse drive. Unlike the reference patents, taken alone or in combination, Applicants' invention does not reverse the direction of rotation of the generator to obtain reverse. Rather, it reverses the direction of the motor 74/74'. The motor is an electric machine that is distinct from the generator.

In the last paragraph on page 4 of the Examiner's Answer, it is indicated that it would be obvious to a person of ordinary skill in the art at the time the invention was made to provide a brake for anchoring ring gear 16_R of the reference '670 patent in view of the teachings of the secondary '155 patent. This observation of the Examiner is irrelevant because in Applicants' invention, the engine can be used during reverse drive to charge the battery. It is not then in an idling state. This observation is irrelevant also because an objective of Applicants' present invention is to enhance reverse drive performance by eliminating the torque reaction on the planetary ring gear that would result if the engine were to be used during reverse drive to charge the battery by driving the generator. The objective of the reference patents, taken alone or in combination, thus has no relationship to the objective of Applicants' invention.

In the case of Applicants' invention, as illustrated in Figure 2, a split-power delivery mode is achieved by releasing brake 60 and engaging clutch 62 so that the planetary gear unit 46 divides power delivery to the traction wheels. That power delivery is complemented separately by the motor 74.

In the second paragraph on page 5 of the Examiner's Answer, the Examiner is incorrect where it is stated that clutch CE1 of the reference '670 patent anchors the ring gear 16_R during split-torque delivery. Actually, when clutch CE1 is engaged, engine torque is delivered to the ring gear 16_R. Applicants' presume that the Examiner intended to use the verb "engage" rather than the compound verb "engages/anchors". In any case, the argument presented by the Examiner at this point is irrelevant since the features of Applicants' invention are used during reverse power delivery. The comments of the Examiner in the third paragraph on page 5 are irrelevant since the reference '670 patent describes an engine starting mode. That mode does not occur during reverse drive. Applicants' invention relates to a reverse drive mode, although it also is capable of forward drive split-power delivery as in the case of the known design of Figure 1.

The Examiner's comments at the bottom of page 5 and at the top of page 6 of the Examiner's Answer are not understood. The Examiner does not explain at this point how the addition of "additional clutches and brakes" could be incorporated in a transmission such as that disclosed in the '670 patent to carry out the functions that Applicants have recited. In any case, the comments at this point of the Examiner's Answer are irrelevant because it is not explained how the addition of so-called "additional clutches and brakes", following the teachings of the reference '670 patent, would enhance reverse drive performance.

In the first full paragraph on page 6 of the Examiner's Answer, reference is made to an embodiment of the invention in Figure 23 of the reference '670 patent, which was not previously discussed by the Examiner. In any case, the description of the embodiment of the invention shown in Figure 23 of the reference '670 patent and the discussion of the Examiner in the Examiner's Answer are irrelevant because in the embodiment of Figure 23 of the '670 patent, the motor is used to control engine speed. It does this by varying the load, or reaction torque, of the planetary gear unit 16. Reverse drive is achieved by engaging clutches CE1, CE2 and 222 in the embodiment of Figure 23 in the reference '670 patent. Further, the Examiner states that Applicants' claims do not exclude rotation of the motor in a reverse direction. Actually, reverse drive is, in fact, achieved by reversing the direction of rotation of the motor. During forward drive, the motor is driven in the positive torque

direction. During reverse drive, the engine is not used to develop reverse drive torque. Reverse drive torque is obtained in Applicants' invention by reversing the direction of rotation of the motor 74 or 74′. This is pointed out throughout Applicants' specification, including paragraphs 008 and 0014.

Applicants do not understand the reasoning behind the Examiner's statements at the bottom of page 6 of the Examiner's Answer and at the top of page 7. Applicants do not agree that every element of Applicants' claims is taught by the reference '670 patent for the reasons previously mentioned. The so-called element-by-element comparison in the table to which the Examiner makes reference is defective for the reasons previously mentioned. Regardless of this shortcoming, the Examiner does not indicate the cooperation of the various elements. Even if every element of the reference '670 patent could be found in Applicants' invention, that would be insufficient to support a rejection based on obviousness since cooperation between the elements must be explained in order to support the rejection.

Applicants do not understand the discussion at the middle of page 7 of the Examiner's Answer. Applicants do not see in column 15, lines 49-67 and column 16, lines 1-4 of the reference '155 patent, any teaching of a structure as defined by Applicants' claims that will permit the engine to drive a generator to charge a battery when the motor is being used in reverse drive. Reverse drive performance for Applicants' invention is not adversely affected when the battery is being charged by the engine-driven generator.

Applicants do not agree with the remarks of the Examiner at the bottom of page 7 and at the top of page 8. Furthermore, those remarks are irrelevant since the reference '670 patent does not disclose anything that rebuts Applicants' arguments on page 12 of Applicants' Appeal Brief with respect to claims 3 and 4. Applicants refer at that place to reverse drive performance. This teaching of the reference '670 patent refers to operation of the vehicle using the output power of the engine. It does not contradict Applicants' argument. Applicants' argument is directed to performance when the motor is being driven in a reverse direction in the reverse drive mode.

Applicants disagree with the Examiner's statements on page 8, middle paragraph, where the Examiner discusses that Applicants' argument that the references do not

show certain features of the Applicants' invention as defined by claim 3. Actually, claim 3 is a dependent claim that depends from claim 2, which refers to a torque flow path during reverse drive using the motor in a reverse drive motor torque flow path that is isolated. It is a fundamental tenet of claim interpretation that dependent claims include in their scope all of the limitations of the parent claims. Furthermore, the comments of the Examiner in the last two paragraphs on page 8 of the Examiner' Answer are not relevant since both claims 5 and 8, as well as claim 3, are dependent claims. All of the limitations of the parent claims should be included in an interpretation of the scope of the dependent claims. Claims 3, 5 and 8 are allowable for the same reasons their parent claims are allowable.

At the top of page 9, first paragraph, the Examiner states that the reference '670 patent shows countershaft gears 32. Actually, gears 32, as well as gears 34, 36, in Figure 1 of the reference '670 patent are not countershaft gears. Indeed, they are mounted on a common axis in a coaxial relationship with respect to the planetary gear device 16. In any case, the gears 32 are not located in the power flow path between motor 14 and the element 26, shown in Figure 1 of the reference '670 patent.

Notwithstanding the foregoing arguments, Applicants point out once again that the Examiner has not addressed a fundamental argument of Applicants that is set out at the bottom of page 14 of Applicants' Brief and at the bottom of page 11 of Applicants' Response to a Notification of a Non-Compliant Appeal Brief mailed by Applicants on December 29, 2006. It is pointed out by Applicants that the claim interpretation of the Examiner in the claim analysis would require a double inclusion of elements. Applicants' invention has a separate motor and a separate generator. These are separate electric machines. In contrast, the motor/generator 14 of the reference '670 patent is a single electric machine. The Examiner has not addressed this point in the Reply Brief. It is impossible, therefore, to apply the well-established *Graham v. John Deere* test, referred to by Applicants on the bottom of page 14 of Applicants' Appeal Brief.

Since each of the reference patents discloses a single electric machine, it would be impossible to apply the language of Applicants' claims to a structure such as the structure shown in the reference patents in view of the double inclusion. Applicants' claims require two

electric machines, as pointed out in the preceding discussion. One electric machine is called a motor and the other electric machine is called a generator. The Examiner has attempted to avoid the implications of a double inclusion by referring to electric machine 14 of the reference '670 patent as a "motor/generator" since that is the term used in the specification of the '670 patent. The functions of the motor/generator 14 of the reference '670 patent and the motor/generator 5 of the reference '155 patent cannot perform the separate functions of Applicants' separate motor and separate generator, as explained by Applicants.

A reversal of the Examiner's rejection is respectfully solicited.

Respectfully submitted,

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